

## **XII. Environmental Impacts**

There have been both positive and negative impacts associated with the Great Flood of 1993. Some of these impacts were evident immediately. However, many of the impacts are still undetermined and will not be known for years to come. This assessment will provide information on all known environmental impacts, both negative and positive, which have occurred as a result of the flooding in the Rock Island District.

Positive impacts include:

a. The flushing of backwater and side channel areas in some locations has proven a benefit to fish and wildlife. Nutrient-rich sediments which mingled with the floodwaters were deposited in these areas. This natural fertilization of aquatic and herbaceous plants should provide luxuriant vegetation for fish and wildlife for years to come.

b. The flooding which expanded into floodplain areas resulted in increased fish habitat by the mere expansion of available area and increased food availability. Although peak spawning had already occurred, fishery biologists have concluded that some species extended their spawning season, as indicated by the presence of small fish throughout the summer. The aquatic vegetation which resulted from the nutrients dispersed by the flooding has benefited the fishery tremendously by providing food and cover for juvenile fish. Certain species of wildlife were beneficially affected by the high water. Species such as wood ducks, herons, egrets and other shorebirds, raccoons, minks, hawks, and eagles gorged themselves on trapped fish.

c. Due to repeated flooding in some urban and agricultural areas, "buy outs" by the Federal government which would revert the areas to floodplain have been negotiated. Areas purchased will have the levees which formerly protected the area breached, thereby increasing the floodplain, decreasing water velocity downstream, trapping sediments and creating fish and wildlife habitat. In the Rock Island District, the Louisa 8 Drainage District has negotiated with federal agencies to sell 3,000 acres of land, 2,500 of which is agricultural land and the other 500, sloughs, backwater lakes and forested wetlands.

d. Levee restoration such as repair of breaches and eroded areas has created fish and wildlife habitat. Hydraulic and mechanical dredging to obtain borrow material has in some cases created vital, deep water, over-wintering habitat for fish. In other cases borrow material obtained from adjacent land has created wetland areas.

Negative impacts include:

a. Some backwater areas with both submerged and palustrine emergent vegetation have been destroyed, due to the sediment load carried in the high water.

b. The Browns Lake EMP project has been slightly affected by siltation. The Andalusia EMP project had a small breach in the levee. The Bay Island EMP project also suffered impacts by destroying approximately \$40,000 of mast producing trees that were planted.

c. The Flood of 1993 started at the beginning of the growing season and lasted all the way through it. Many plants were under water for the duration of the flood and were further stressed by turbidity and depth of water which didn't allow the sunshine to reach the plants. The shoreline vegetation and the invertebrates that waterfowl rely on for protein production were not available.

d. Due to the torrential downpours which occurred during this period and the resultant swelling of rivers and streams, both sheet erosion and bank erosion were tremendous.

e. It is difficult to assess the impacts to trees as a result of the high water, since they die so slowly. However, it has been determined that the most significant damage to Corps forests is going to be in the reservoirs. Tree species that were impacted by high water were typically upland species, and many of these were completely under water. In the bottomland forests, tree species such as silver maple, box elder, willow and cottonwood are accustomed to floods and have the ability to quickly rebuild damaged roots. Other trees such as oak, hickory, and pecan are marginal bottomland species and do not have the ability to recover quickly. There is a possibility that these species may die within the next two to three years. Another effect of the flood on trees is shoreline windthrow or blowdown. Saturated soil, combined with the pressure of the flood water and wind from the summer storms, caused blowdown of many trees. In many situations, tree roots were interconnected, so when there was blowdown, there was a domino affect.

f. The severe erosion associated with the flooding has caused the loss of significant archeological resources throughout the system. The anticipated future loss of shore line vegetation due to long term high water exposure may further accelerate the erosion of landforms containing significant archeological resources. No attempt was made, as part of this report, to systematically evaluate the impacts. A recent report compiled by the Office of State Archaeologist, the University of Iowa, Iowa City, titled Archaeology and the Great Midwestern Floods of 1993, Research Papers Vol 19, Number 4, edited by William Green and Robin Lillie, 1994, summarizes a number of impact assessment studies conducted as a result of the floods. Numerous historic structures were either damaged or destroyed by the flood.

g. Water quality impacts of the flood were measured by a number of researchers. The USGS focused its attention on the transport of agricultural chemicals in the Mississippi River basin. They noted unusually high concentrations of several herbicides despite the extremely high river flows. Dilution of agricultural runoff, which would ordinarily be observed under flood flows, was not seen in 1993. This resulted in very high chemical loading to the rivers throughout the Upper Mississippi basin. In addition, they speculate that the quantity of nutrients and fresh water which eventually entered the Gulf of Mexico could affect the gulf ecosystem. Similar observations were made by researchers at the University of Iowa regarding agricultural runoff. Suspended sediment transport, as measured at monitoring stations along the Mississippi River and several major tributaries, was also quite high throughout the summer. Because the navigation dams on the Mississippi River were out of operation during much of this time, it is unclear how much of this sediment was trapped within the navigation pools.

Many reports have been produced which describe in greater detail the impacts of the flood on environmental resources. It is not the intent of this report to list and summarize previous work. In addition, the Corps is currently engaged in the Flood Plain Management Assesment (FPMA) for the five district area most affected by the Great Flood. The FPMA, scheduled for completion in June 1995, will inventory and describe the pre-flood resource conditions, evaluate the impacts of the flood on those resources, and describe potential impacts of various alternative scenarios.